Measures to improve Russian federal strategy of the construction materials industry development

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Abstract
The construction materials industry is a multi-industrial complex which forms the resource base for the implementation of virtually all regional and local projects. Sustainable development of this industry, like any other industries, is largely dependent on the federal and regional government policies. This article analyzes the current federal strategy of the construction materials industry of Russia. The analysis shows that one of its key shortcomings is the lack of eco-efficiency indicators and forecast of environmental technologies implementation. To improve the strategic programme the following measures are proposed: introduction of environmental performance indicators (9 indicators); increasing the tax rate on limit and above-limit emissions into the atmosphere; implementation of clear system of ecological monitoring by the Ministry of Natural Resources and Ecology of the Russian Federation.

Introduction

Sustainable development is a key concept for the development of industries and regions in the past two decades. At the global level, the United Nations identifies 17 key objectives that define sustainable development of mankind, and which are reflected in the target programs of the organization. At the country level, the main goals of sustainable development established by the Government and included in the federal and regional strategic programs, policies and legislation. On the basis of these instruments are determined the model of functioning of enterprises in the country and the way of life of the population (Kozlov et al. 2015).

Despite some differences between regional approaches, the need to preserve the environment and careful use of exhaustible resources is a common goal. In developed countries, this need is ensured by the introduction of a comprehensive system of state regulation. Emerging countries are less supportive of such initiatives due to the influence of a number of specific factors. This applies especially to countries with significant mineral resources.

One of the key areas of the economy's sustainable development is government regulation of the mining industry. In the center of global attention is the extraction and processing of energy resources, while production of non-metallic building materials is not overviewed enough in the world's scientific literature, despite the strategic importance for any country (Peshkova et al. 2016).

Fundamentals of state regulation of industries in the field of ecology

Any environmental projects are costly in terms of business. In connection with this, the only stakeholder which may have an impact on the policy of the enterprises is the government (Figure 1). Of course, it does not concern industries where the lack of environmental technologies can lead to the death of workers in the short term.
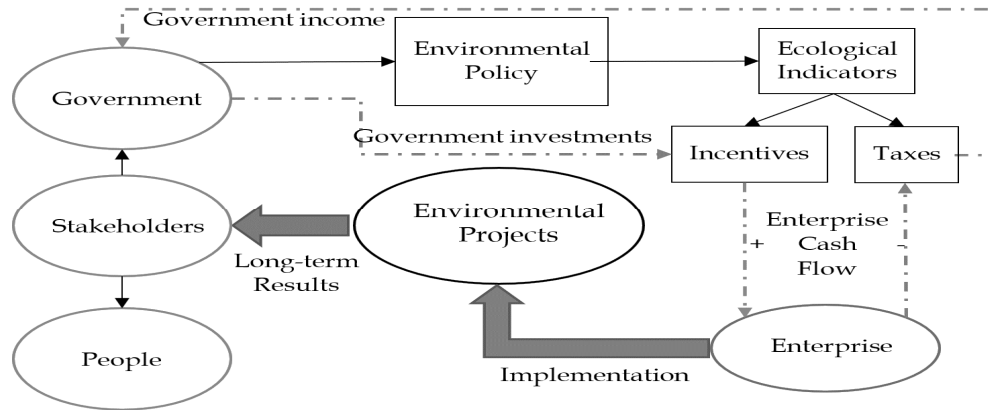

Figure 1. The general scheme of state regulation

In global practice, there are two main ways to improve environmental activity of the enterprises. The first - the tightening of fiscal policy. The advantage of this approach is that the state does not have to spend budget funds for implementation of environmental protection measures. However, the excessive tax burden may negatively affect the financial results of companies. In this case, the implementation of environmental projects happens when the tax payments in the medium term outweigh the costs for the project (Gutman et al. 2015).

The second - the introduction of incentive policies for enterprises implementing environmental projects. The disadvantages of this approach are the need for budget spending, as well as the absence of guarantees of receiving a positive effect from businesses. An advantage is the lack of additional financial burden on businesses. Also, there are cases with combination of these methods. The question of choosing the optimal approach to government regulation is determined by the availability of financial resources, industrial sector's efficiency and targeted environmental efficiency indicators.

Thus, the assessment of the environmental effectiveness of the strategic program of construction materials industry can be based on the following factors: the existence of a state policy in the field of environmental protection; presence in the strategic program of measurable indicators of the ecological impact; the existence of specific mechanisms for implementing the strategy; the presence of the necessary statistical information.

Environmental supervision for construction materials industries in Russia

Mining has a significant impact on the environment, regardless of the presence / absence of environmental technologies (Figure 2).
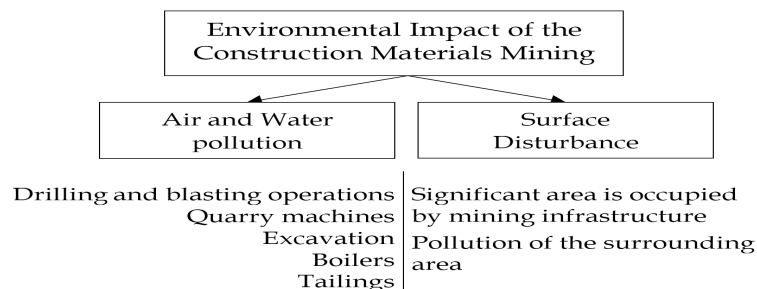

Figure 2. Environmental Impact of the Construction Materials Mining

The situation is similar with dressing plants. The location of these plants selected as close as possible to the field of raw materials. This is associated with high share of transport costs in the price of the final product. In other words, the plants are usually located on the fields (Teslya et al. 2015). The main environmental restrictions in Russia for the mining of construction materials deposits are the following factors:

- Water bodies located on the territory of the field or near it (high rate of penalties for emissions of pollutants into water bodies);
- Protected areas, where mining operations and the construction of industrial facilities is prohibited;
- Agricultural lands (industrial activity requires expensive transfer of lands in the industrial category);
- Forest resources (industrial activities in protected forests is prohibited by law).

Despite the existence of such restrictions by the state, it is common situation when the regulatory authorities' requirements are not met (Didenko et al. 2015). This applies particularly to the unlicensed mining of building materials, which is another common situation in Russia, especially in the North-West Federal District.

And if payment for emissions of pollutants into water bodies are tangible even for large enterprises (Pivovarova and Makhovikov 2016), the penalties for air emissions are much lower than in developed countries (Table 1). Total payments for the emissions of pollutants are calculated by the formula 1.

Pollutant	2016	2017	2018
Suspended solids	35,1	36,6	36,6
The ash of the solid fuel	14,5	15,1	15,1
Carbondioxide	1,5	1,6	1,6
Inorganic dust containing silicon dioxide:			
above 70 percent	105	109,5	109,5
70 - 20 percent	53,8	56,1	56,1
below 20 percent	35,1	36,6	36,6

Table 1. Taxes for pollutants emission, RUR/t.

$$P = k_{reg} * (T_n * E_n + T_n * k_l * (E_l - E_n) + T_n * k_{al} * (E_{al} - E_l)), \qquad (1)$$

P – total amount of environmental payments, RUR; k_{reg} – regional increasing coefficient; T_n – tax rate for normative emission; E_n, E_l, E_{al} – normative, limit and above-limit emissions (fact amount), ton; k_l – increasing coefficient for limit emission (5 units); k_{al} – increasing coefficient for above-limit emission (25 units).

Analysis of the current strategy of the construction materials industry

Federal strategic program "Strategy of development of the industry of construction materials for the period up to 2020 and beyond to 2030" was approved May 10, 2016. The aim of this strategy is to set guidelines for the development of national construction materials industry and the creation of regional strategic programs.

The strategy is a "recommendation" document drawn up on the basis of a retrospective analysis of the market, the key problems in the industry, as well as successful international experience. It pays considerable attention to the supply of the resources for industry (for example, highly qualified professionals), as well as the development of inter-sectoral collaboration. However, no attention is paid to ensure mineral resources, which are the basis for the functioning of this industry. In addition, there are only few words about the development of environmental

technologies and environmental conservation. Summary description of the Strategy is presented in Table 2.

Characteristic	The approach of the Strategy
Concrete recommendations for the development of regional strategic programs, including the environmental protection field	Specifies the global direction of development, which should be the guideline for regional authorities. There are no recommendations for the development of environmental technologies. Not considered the impact of mining enterprises on the environment, emissions monitoring, and the system of penalties for excess emissions of pollutants. In otherwords, many issues were elaborated insufficiently.
Industrial coverage	Extractive industries, transportation, manufacturing industries, sales. No exploration industry, as well as the evaluation of promising options for land use of waste deposits.
The validity of judgments	The basis of the expected outcomes, which are defined by stages of the Strategy is not clear. The strategy is not supported by a list of activities.
The creation of new structures and departments	The creation of research center "industrial science" and industrial engineering center "equipment and technology". However, among the tasks of these centers does not mention the development of technologies for environmental performance improvement.
The state department, responsible for coordination and implementation of the strategy	At the federal level - the Government of the Russian Federation, the Ministry of Industry and Trade. At the regional level it is not specified.
Outsourcing experts from industries and research organizations	Not specified.
Availability of the environmental efficiency indicators	Only one indicator could be attributed to the group of "eco-efficiency indicators" - "Volume of use and disposal of production and consumption wastes in the construction materials industry." Based on the nature of the strategy we can say that the inclusion of this indicator was connected with financial aspects, not with environmental factors.

Table 2. Summary description of the strategic program

Proposals for the strategy improvement

We see two main areas for optimization of the Strategy:

1. The gradual tightening of the tax rate on pollutant emissions.

Fee for environmental pollution in Russia does not fulfill functions of environmental measures promotion and the accumulation of funds for environmental protection. It is much more profitable to pay for pollution, than to carry out environmental protection measures (Ponomarenko et al. 2016).

Given this and the fact that the volume of normative emissions is coordinated at the stage of designing the enterprise, it is proposed to leave the tax on normative emissions at current levels. However, it is necessary to increase the tax rate for limit and above-limit emissions significantly. For limit emissions: in 2018 - a sevenfold increase (in comparison with normative emissions), since 2019 - a tenfold increase (instead of the current rate equal to 5). For excess emissions: in 2017 - a thirtyfold increase, since 2019 - a 35-fold increase (instead of the current rate equal to 25). Figure 3 shows the proposed change in the tax rates on the example of solid fuels ash emission.
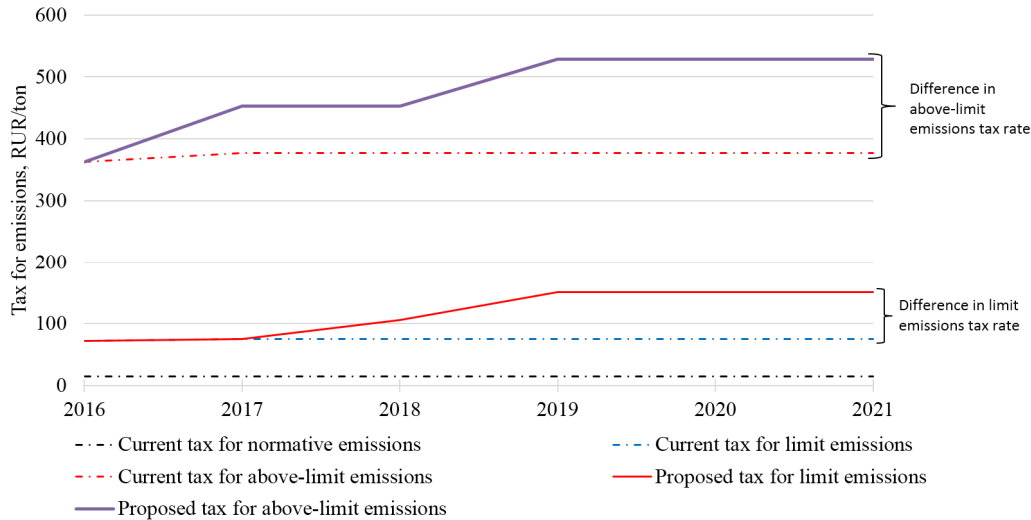
Figure 3. Proposed rates change in the tax rate on the example of solid fuels ash emission

Increasing the tax rate for emission will allow increasing the attention of enterprises to environmental protection and the implementation of environmental measures, including in the field of energy efficiency. It will also allow reducing the number of inefficient enterprises, the excess of which is currently observed. It is also possible to reduce the state budget deficit and send a part of the money back into the industry for the development of environmental technologies.

2. Development of target values of environmental indicators that shall be monitored by the Ministry of Natural Resources and Ecology of the Russian Federation.

Lack of target values of environmental indicators and indicator of the raw material base development is one of its key weaknesses of the Strategy in the context of sustainable and long-term development.

The development of the mineral resource base of the region is proposed to assess by the coefficient of reserves replenishment, which reflects the ratio of increase in reserves of minerals (I) to the annual volume of production (P) (Formula 2).

$$R = \frac{I}{P} \tag{2}$$

The implementation of resource-saving and environmental technologies is to assess by the following indicators calculated as the arithmetic mean for the respective branches of construction materials industry: the energy intensity per unit of gross added value (GAV) of the industry (formula 3 and 4), rate of waste formation (Formula 5), rate of emission payments (formulas 6 and 7), the coefficient of minerals extraction (formula 8), land consumption (formula 9).

$$E^n = \frac{E_t}{GAV}, \tag{3}$$

E_t – The amount of consumed energy, toe; GAV – Gross Added Value, RUR.

Typically, energy consumption evaluation limited the calculation formula 3. However, in the Russian conditions we consider that calculation of this indicator in monetary terms is necessary. This is due to ineffective energy policy of the State, with natural gas, oil and coal as main energy resources, which costs increasing annually (Fedoseev and Tsvetkov 2015).

$$E^f = \frac{E_R}{GAV}, \tag{4}$$

E_R – The amount of consumed energy, RUR; GAV – Gross Added Value, RUR.

$$W = \frac{V_w}{V_p}, \tag{5}$$

V_w - the volume of wastes, m³, V_p - production volume for processing industries and extraction volume for mining, m³.

$$D^f = \frac{P}{V_p} \qquad (6)$$

P - total payments for the damage, caused to environment, RUR.

$$D^n = \frac{E}{V_p} \qquad (7)$$

E - total emission, tons.

$$M_e = \frac{V_m}{R} \qquad (8)$$

V_m - the volume of extracted minerals, m³, R - regional mineral resources, m³.

$$L_c = \frac{L}{V_p} \qquad (9)$$

L - lands, involved in production process, km².

Land consumption is of particular relevance due to the fact that most of the construction materials fields are quarried, what requires the use of large areas. In addition, it is necessary to monitor the process of land reclamation (the ratio of the reclaimed areas (R_a, km²) to the total area of disturbed lands (D, km²) (Formula 10)). This is especially true of depleted fields, many of which are converted into unlicensed landfills (Nevskaya et al. 2016).

$$R_L = \frac{R_a}{D} * 100 \qquad (10)$$

Moreover, the existing system for monitoring of the environmental situation in Russia does not allow to collect any reliable data in the scale of regions and federal districts (Pivovarova 2015). Companies in most cases do not publish statistical reports and strategic plans in open access, what should be reflected in the industrial strategy.

Discussion and conclusion

Construction materials industry has an impact on all elements of the geosphere and, perhaps most significantly on the sociosphere. In addition to emissions of pollutants into the atmosphere and water bodies, production of building materials, which usually made by quarry method, requires the use of large areas under infrastructure and dumps.

Sustainable development of the construction materials industry, like any other industry, is possible only in the presence of rigid state control for the implementation of environmental and resource-saving technologies. Currently, only one document exists in Russia, dedicated to construction materials industry, which could be classified as strategic. Despite its comprehensive nature, the environmental aspects of the companies functioning are briefly mentioned in different parts.

In contrast to the oil and gas industries, enterprises of the construction materials industry do not disclose the results of their activities, which is reflected in the absence of open access to the annual reports, strategic plans, environmental policies, etc. This is a significant barrier to a detailed analysis of the industry. Usually it is not even possible to determine the number of mining companies operating in the region.

The existing legal base of Russia assumes the minimum taxes rates for emissions of pollutants into the atmosphere, which cannot be regarded as an effective incentive for environmental projects implementation. In addition, there are no available funds in the state budget for any environmental activities.

There are many examples in Russian practice of borrowing foreign experience without adaptation. For example, there are a number of proposals to increase tax rates for normative

emissions in the dozens of times. However, taking into account low efficiency of the extractive enterprises (mainly due to the use of the outdated technologies), such increase can definitively destroy the industry.

To solve these problems, three solutions were proposed in this article. Firstly, eco-efficiency indicators must be included in the strategy of the construction materials industry development. At the same time, accepted to improve environmental safety measures must be coordinated with the policy of the industrial modernization supported by government.

Secondly, to date, the issues of ecological monitoring are within the competences of the Ministry of Natural Resources and Environment. However, the current system is inefficient, partly, due to significant corruption component. The development of independent civil society organizations that have the right to certify enterprises for compliance with environmental standards could be the decision of this problem. Such organizations could provide transparent monitoring process. At the initial stage, it can increase public and industrial awareness of environmental issues.

Thirdly, in order to attract financial resources and to create incentives for companies to introduce environmental technologies the increasing of tax rate for air emissions was proposed. These measures are medium-term alternative to a long and laborious process of developing and implementing of new environmental standards for the industries of Russia.

It also should be mentioned, that transferring the responsibility for environmental impact to customers (construction companies) in the form of "green taxes" without state regulation of apartments prices could deteriorate the present situation. The Russians do not have the "financial assurance", and mostly are looking for the cheapest apartment options, usually in the houses of the Soviet period (1970-s and older). With the introduction of "green taxes" the demand for apartments in new buildings can be reduced to a critical level, which will lead to the bankruptcy of a large part of the construction sector, which is already in decline.

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